Salton Sea Ecosystem Restoration Plan Inflow Update

Advisory Committee
May 18, 2005
Sacramento, CA

Inflow Topics for Discussion

- **Model Working Group**
- **Update on Progress of Working Group**
  - **Historic Flows**
  - **QSA No Action/Baseline**
  - **QSA Flows**
  - **No Action Alternative**
  - **Model Development**
- **Next Steps For Working Group**
  - **Variability**
  - **Model Identification**

Purpose of Model Working Group

- **Forum for exchange of info and ideas on model development and assumptions**
- **To provide guidance on model *input* assumption development**
- **To provide guidance on *model development* and approaches**

Model Working Group

- **May 11, 2005**
  - **First Meeting**
  - **Reviewed basis of No Action Alternative**
- **Next Meetings**
  - **Finalize basis of No Action Alternative**
  - **Variability of Inflows**
  - **Model selection and development of assumptions**

Model Working Group Participants

- **USBR**
- **ARB**
- **IID**
- **CVWD**
- **SSA**
- **Defenders of Wildlife**
- **Imperial Valley Farm Bureau**
- **Torres Martinez**
- **Imperial Group**
- **Local Farmer**
- **Imperial Valley Farm Bureau**
- **California Farm Bureau**

Inflow Projections Used for Different Purposes in SS ERP PEIR

- **No Action Alternative**
  - **Reasonably foreseeable per CEQA**
  - **Basis of impact assessment**
- **Variability**
  - **May be less defined**
  - **Can be used in Cumulative Impact Assessment**
  - **Needed to determine design criteria for alternatives - addresses potential risks**

Inflow Discussion Goal

- **Reach agreement on QSA as basis of the No Action Alternative**
  - **Definition**
  - **Methodology**
  - **Actual values being developed by working group**

Inflow Building Blocks

- **Historic Flows**
- **Baseline (No Action) for the QSA**
- **QSA Inflows under the adopted QSA**
- **No Action Alternative**

Historic Flows

- **Table 1 of Handout**
- **From IID Water Conservation and Transfer EIR/EIS – Appendix F – Table 2.2**
  - **1950-1999 – Period of Record**
  - **Data provided by IID and CVWD**
  - **Unmeasured flows calculated via model calibration**

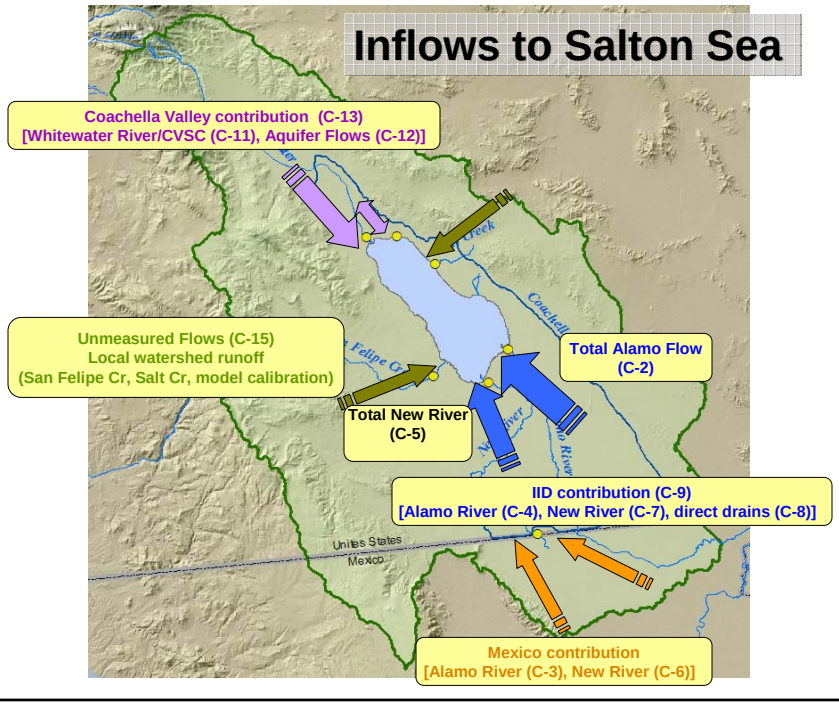
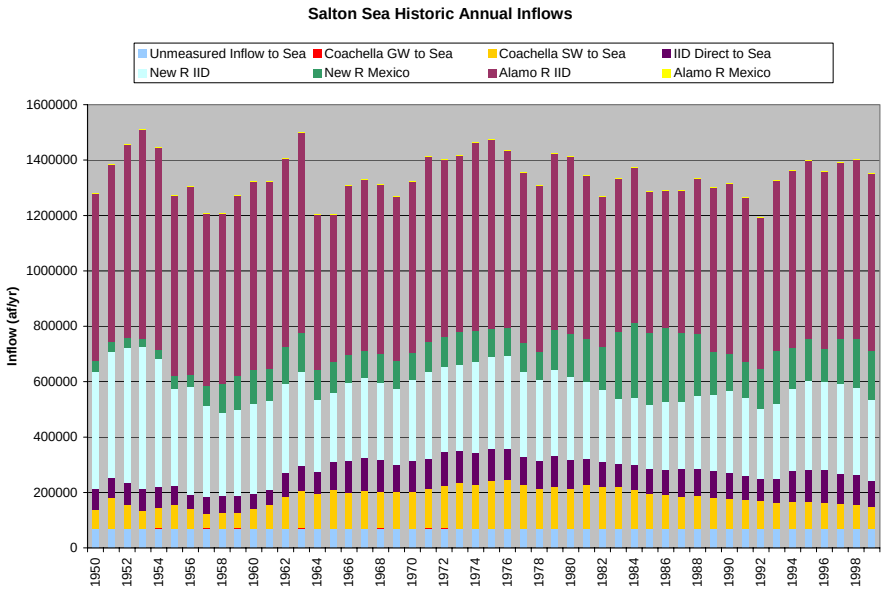


Table 1. Salton Sea Water Budget

Table 2.2 From Appendix F - Salton Sea Historic Water Budget

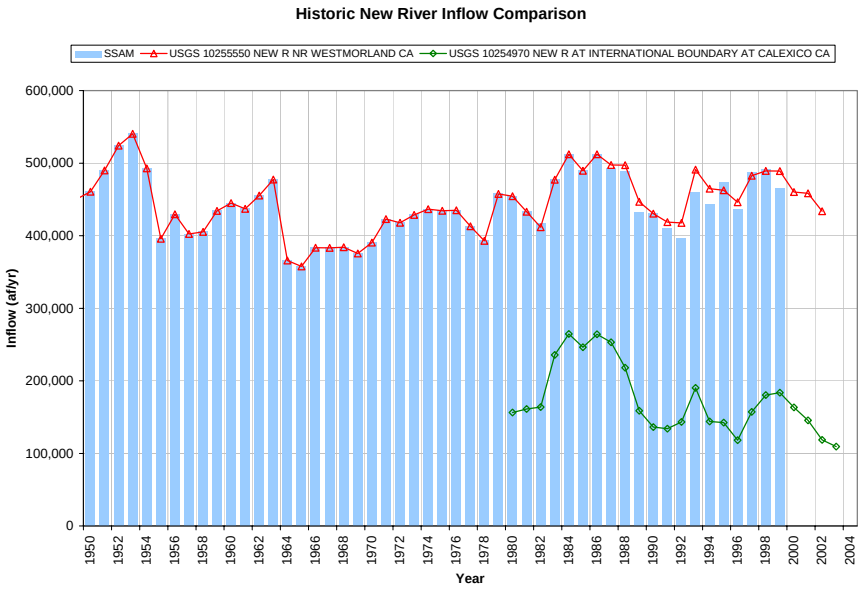
Col. 1	Col. 2 (= Cols. 3 + 4)	Col. 3	Col. 4	Col. 5 (= Cols. 6 + 7)	Col. 6	Col. 7	Col. 8	Col. 9 (= Cols. 4 + 7 + 8)
Year	Historic Alamo R. Inflow (af)	Historic Alamo R. Inflow from Mexico (af)	Historic Alamo R. Inflow frm IID 1/ (af)	Historic New River Inflow (af)	Historic New River Inflow from Mexico (af)	Historic New River Inflow from IID (af)	Historic IID Direct to Sea 1/ (af)	Historic IID to Sea Total 1/ (af)
1950	606,862	1,393	605,469	460,665	36,992	423,673	75,658	1,104,800
1951	642,031	1,385	640,646	489,668	35,508	454,160	74,621	1,169,427
1952	697,247	1,250	695,997	524,461	35,917	488,544	76,032	1,260,573
1953	756,663	1,308	755,355	540,547	31,116	509,431	81,212	1,345,998
1954	732,821	1,431	731,390	492,737	29,505	463,232	78,588	1,273,210
1955	654,455	1,915	652,540	395,860	46,985	348,875	68,394	1,069,809
1956	684,155	2,042	682,113	429,655	42,713	386,942	52,333	1,121,388
1957	622,850	1,762	621,088	402,516	70,845	331,671	58,620	1,011,379
1958	614,481	1,991	612,490	405,194	103,983	301,211	60,344	974,045
1959	651,750	1,819	649,931	434,219	121,824	312,395	58,637	1,020,963
1960	682,450	1,921	680,529	445,059	121,312	323,747	55,528	1,059,804
1961	675,576	1,795	673,781	436,967	115,031	321,936	54,983	1,050,700
1962	681,100	1,705	679,395	455,330	132,179	323,151	86,419	1,088,965
1963	723,765	2,158	721,607	477,479	138,936	338,543	93,647	1,153,797
1964	563,557	1,834	561,723	365,857	105,087	260,770	82,660	905,153
1965	535,096	1,798	533,298	357,747	111,339	246,408	103,256	882,962
1966	610,745	1,545	609,200	383,469	102,958	280,511	114,974	1,004,685
1967	621,091	1,556	619,535	383,211	96,899	286,312	122,123	1,027,970
1968	611,089	1,469	609,620	384,078	106,019	278,059	113,348	1,001,027

Col. 10 (= Cols. 3 + 6)	Col. 11	Col. 12	Col. 13 (= Cols. 11 + 12)	Col. 14 (= Cols. 9+10+13)	Col. 15	Col. 16 (=Cols. 14 + 15)
Total Historic Mexico to Sea 1/ (af)	Historic Surface Flows to Sea from CVWD (af)	Historic Aquifer Flows from CVWD 2/ (af)	Total Historic from CVWD 2/ (af)	Total Historic Reported Inflow (af)	Total Unmeasured Inflow 3/ (af)	Total Historic Inflow (af)
38,385	65,811	2,710	68,521	1,211,706	68,400	1,280,106
36,893	108,765	2,632	111,397	1,317,717	68,400	1,386,117
37,167	87,139	2,341	89,480	1,387,220	68,400	1,455,620
32,424	62,607	2,396	65,003	1,443,425	68,400	1,511,825
30,936	72,467	2,064	74,531	1,378,677	68,400	1,447,077
48,900	85,367	2,016	87,383	1,206,092	68,400	1,274,492
44,755	70,602	2,067	72,669	1,238,812	68,400	1,307,212
72,607	53,368	2,205	55,573	1,139,559	68,400	1,207,959
105,974	56,358	2,243	58,601	1,138,620	68,400	1,207,020
123,643	57,105	2,345	5945Q	1,204,056	68,400	1,272,456
123,233	70,431	2,336	72,767	1,255,804	68,400	1,324,204
116,826	83,894	2,290	86,184	1,253,710	68,400	1,322,110
133,884	112,692	2,241	114,933	1,337,782	68,400	1,406,182
141,094	133,333	2,062	135,395	1,430,286	68,400	1,498,686
106,921	123,248	1,991	125,239	1,137,313	68,400	1,205,713
113,137	138,788	2,172	140,960	1,137,059	68,400	1,205,459
104,503	128,071	2,220	130,291	1,239,479	68,400	1,307,879
98,455	133,784	2,244	136,028	1,262,453	68,400	1,330,853
107,488	133,097	2,262	135,359	1,243,874	68,400	1,312,274



Working Group Action Items

- **Resolve discrepancies between published Historic Data and Gage Data**
  - **Alamo River - Column 2 From Historic Water budget and USGS gage at Niland from 1982 to 1999**
  - **New River – Column 4 from historic water budget and USGS gage at Westmorland from 1987 to 1999**



Inflow Building Blocks

- Historic Flows
- **Baseline (No Action) for the QSA**
- QSA Inflows under the adopted QSA
- No Action Alternative

QSA Baseline- No Action for QSA

- **Table 2 of Handout**
- **Table 4.1 from Appendix F**
  - **Projects historic flows forward**
  - **For IID, flows used 12 years of inflows with 75 years of climate data**
  - **CVWD flows provided by CVWD**
  - **Mexico flows 158,592 AFY**
    - Average of measured flows during1989-1999
    - plus 3% year to account for increased salinity

Table 2. QSA Baseline Inflows to the Salton Sea

Table 4.1 From Appendix F - Present Level Water Budget - Represents Baseline for the QSA - PRE-QSA Implementation

Year	Mexico Baseline Inflow (af)	IID Baseline Discharge to Sea (af)	Baseline Drains and CVSC from CVWD (af)	Baseline Aquifer Flows from CVWD (af)	Baseline CVWD Discharges to Salton Sea (af)	Entitlement Enforcement (af)	Unmeasured Flows (af)	Total Flows To Salton Sea (af)
2000	158,592	952,178	77,534	-455	77,079	-56,856	68,400	1,199,394
2001	158,592	1,053,354	76,222	-524	75,698	-56,856	68,400	1,299,188
2002	158,592	1,019,665	75,836	-581	75,255	-56,856	68,400	1,265,056
2003	158,592	980,000	75,682	-633	75,049	-56,856	68,400	1,225,185
2004	158,592	949,340	76,429	-686	75,743	-56,856	68,400	1,195,219
2005	158,592	940,522	76,967	-742	76,225	-56,856	68,400	1,186,883
2006	158,592	934,397	77,174	-801	76,373	-56,856	68,400	1,180,906
2007	158,592	1,027,601	77,176	-862	76,314	-56,856	68,400	1,274,052
2008	158,592	938,780	76,678	-928	75,750	-56,856	68,400	1,184,667
2009	158,592	976,357	76,220	-993	75,227	-56,856	68,400	1,221,720
2010	158,592	940,652	75,824	-1,057	74,767	-56,856	68,400	1,185,555
2011	158,592	1,096,364	75,437	-1,119	74,318	-56,856	68,400	1,340,819
2012	158,592	1,102,122	75,106	-1,178	73,928	-56,856	68,400	1,346,186
2013	158,592	1,035,992	74,774	-1,236	73,538	-56,856	68,400	1,279,666
2014	158,592	1,015,039	74,463	-1,292	73,171	-56,856	68,400	1,258,346
2015	158,592	1,057,841	74,172	-1,345	72,827	-56,856	68,400	1,300,804
2016	158,592	958,137	73,958	-1,396	72,562	-56,856	68,400	1,200,835
2017	158,592	1,097,408	73,780	-1,441	72,339	-56,856	68,400	1,339,882

Entitlement Enforcement Reduction

- **3.85 MAFY for Priorities 1,2, 3a and 3b**
  - **0.42 MAFY Historic Use for Priorities 1 and 2 (PVID and Yuma Project)**
  - **3.43 MAFY left for Priorities 3a and 3b (IID and CVWD)**
  - **Prior to QSA Priorities 1,2 3a and 3b consistently diverted more than 3.85**
  - **QSA Baseline assumes CA conformance to 4.4 Plan and no available surplus**

Entitlement Enforcement (cont.)

- **Projected demands by CVWD and IID show that on average their diversions need to be reduced by 59,210 AFY to stay within aggregate apportionment of 3.43 MAFY**
- **Assumes reduction of 59,210 AFY via efficiency**
- **Assumes system losses of 2.4 KAFY from Colorado River diversion point to Sea and reduction of inflows to Sea of 56,856 AFY**

Working Group Action Items on QSA Baseline

- **Clarify what climate data was used to generate hydrologic data**

Inflow Building Blocks

- Historic Flows
- Baseline (No Action) for the QSA
- **QSA Inflows under the adopted QSA**
- No Action Alternative

Inflows under Adopted QSA

- **Water budget based on modeling conducted for approved QSA delivery schedule in QSA and IID Water Conservation and Transfer Project Addenda**
- **Specific values under development by Working Group**

Revised QSA Delivery Schedule by Conservation Method

Agmt Yr.	Cal Yr.	IID/SD (KAF)	IID/CVWD (KAF)[1]	IID/MWD (KAF)	Total Delivery (KAF)	Total Efficiency (KAF)	Fallowing for Delivery (KAF)	Mitigation Fallowing (KAF)	Total Fallowing (KAF)
1	2003	10	0	0	10	0	10	5	15
2	2004	20	0	0	20	0	20	10	30
3	2005	30	0	0	30	0	30	15	45
4	2006[2]	40	0	0	40	0	40	20	60
5	2007	50	0	0	50	0	50	25	75
6	2008	50	4	0	54	4	50	25	75
7	2009[2]	60	8	0	68	8	60	30	90
8	2010	70	12	0	82	12	70	35	105
9	2011	80	16	0	96	16	80	40	120
10	2012[2]	90	21	0	111	21	90	45	135
11	2013	100	26	0	126	46	80	70	150
12	2014	100	31	0	131	71	60	90	150
13	2015	100	36	0	136	96	40	110	150
14	2016	100	41	0	141	121	20	130	150
15	**2017**	**100**	**45**	**0**	**145**	**145**	**0**	**150**	**150**
16	2018	130	63	0	193	193	0	0	0
17	2019	160	68	0	228	228	0	0	0
18	2020	192.5	73	0	265.5	265.5	0	0	0
19	2021	205	78	0	283	283	0	0	0
20	2022	202.5	83	0	285.5	285.5	0	0	0
21	2023	200	88	0	288	288	0	0	0
22	2024	200	93	0	293	293	0	0	0
23	2025	200	98	0	298	298	0	0	0
24	2026	200	103	0	303	303	0	0	0
25	2027	200	103	0	303	303	0	0	0
26	2028	200	103	0	303	303	0	0	0
27-45	2029-2047	200	103	0	303	303	0	0	0
46-75[3]	2048-2077	200	50	0	250	250	0	0	0

Note 1: If CVWD declines to acquire these amounts, MWD has an option to acquire them, but acquisition by MWD of conserved water in lieu of CVWD during the first 15 years is subject to satisfaction by MWD of certain conditions, including subsequent environmental assessment (see Table 1-1, Section E)

Note 2: In addition to the conserved amounts shown on this Table, additional amounts of up to 25 KAF in 2008, 50 KAF in 2009 and 70 KAF in 2012 could be conserved to meet the ISG benchmarks. IID has the discretion to select the method of conservation used to make the ISG backfill water. If fallowing is selected to conserve water to meet the ISG benchmarks, the total acres of fallowing would be within the amount originally evaluated in the EIR/EIS.

Note 3: This assumes that the parties have approved the extension of the 45-year initial term of the Proposed Project.

Inflow Building Blocks

- Historic Flows
- Baseline (No Action) for the QSA
- QSA Inflows under the adopted QSA
- **No Action Alternative**

No Action Alternative

- **New projects / policies / data since QSA Approval**
  - **Mexico inflows (reduction of Surplus)**
  - **Mexicali wastewater**
  - **Mexicali power plant**
  - **Incorporation of recent CVWD Water Management Plan**
  - **Refinement of local watershed contributions**
  - **Consider available data on evaporation rates**

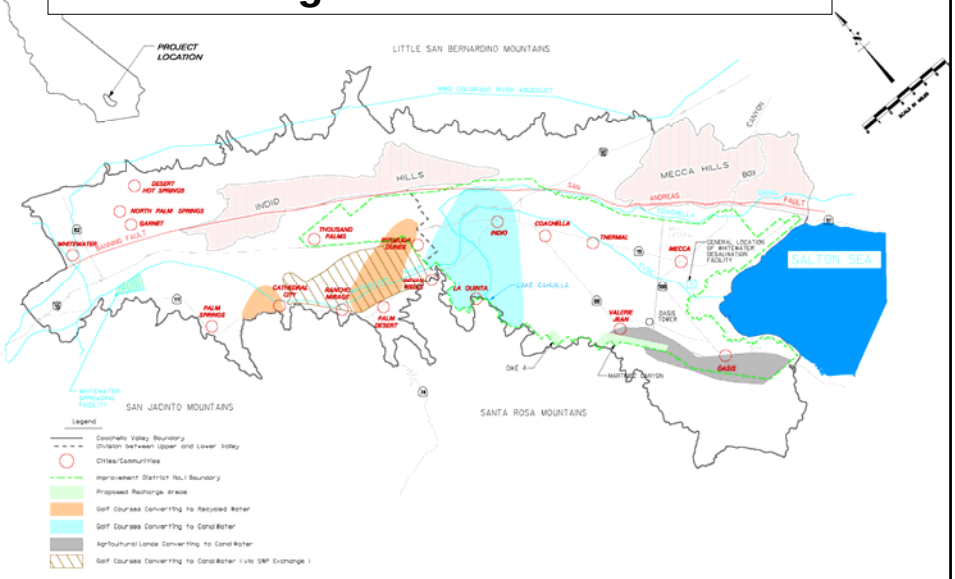
Mexico Inflows (reduction of surplus)

- **Under QSA flows were based on average between 1989 to 1999 plus 3% = 158,592 AFY**
- **Working group considering several other approaches**
  - **Average flow between 1963 and 2004 – Longer period**
  - **Average flow 1963 to 1972 when no surplus was available = 109,921 AFY**
  - **Consideration for land use projections in Mexico and resulting water demands = ?**

Other Reductions in Inflows from Mexico

- **2003 EIS for 2 power plants in Mexico**
  - **Reduce Salton Sea inflows by 10,700 AF**
- **December 2003 EA for Mexicali Wastewater Treatment and Conveyance**
  - **Reduce Salton Sea inflows by 21,400 AF**

Include Results from Coachella VWD Water Management Plan /EIR- 2003



Refinement of "Unmeasured Flows"

- **Previously one "catch all" category included uniform value for known and unknown values**
  - **San Felipe and Salt Creek**
  - **Other local watershed runoff**
  - **Model calibration / reconciliation**
- **SS ERP No Action water budget may**
  - **Use available gage data on San Felipe and Salt Creeks**
  - **Revisit development of evaporation rates**
  - **Use new model requiring new calibration term**

Inflow Building Blocks

- **Historic Flows**
- **Baseline (No Action) for the QSA**
- **QSA Inflows under the adopted QSA**
- **No Action Alternative**

Next Inflow Steps for Working Group

- **Develop Range of Flows ("Variability")**
  - **Climate Change (Wet to Dry)**
    - Local changes in temperature, evaporation and precipitation
    - Local changes in evapotranspiration (ET) and consumptive demands
  - **Reductions in Tailwater or Tilewater**
    - Changes in Irrigation Practices
    - Changes in Crops
    - Conversion of Lands (Ag to M&I – Population Growth)
  - **Water Demands in Mexico affecting New River inflows**
- **Suggested sources of information?**
  - **Recommendations from Advisory Committee??**

Purpose of Model Working Group

- **Forum for exchange of info and ideas on model development and assumptions**
- **To provide guidance on model *input* assumption development**
- **To provide guidance on *model development* and approaches**

In addition to Inflows … Other Issues to be resolved for Model Development

- **Salt loading assumptions**
- **Salt precipitation dynamics**
- **Evaporation-salinity relationships**
- **Evaporation/rainfall partitioning and projections**
- **Consistency in use of climatic data**
- **Bathymetric survey data**

Model Development Goals

- **Hydrologic and salinity analysis of Salton Sea alternatives to measure performance**
- **Provide information to assist alternative design**
- **Evaluate Salton Sea impacts due to hydrologic uncertainty**
- **Publicly-available, documented analysis tool**
- **Facilitate consistency of data**
- **Serve as a analysis tool beyond the ERP**
- **Suite of models may be necessary**

Potential Model Requirements

- **Simulate future Salton Sea elevation and salinity under varying configurations and inflow assumptions**
- **Account for full water and salt balances**
- **Monthly and/or annual time steps**
- **Incorporate multiple impoundments and major components or processes of likely alternatives**
- **Optimize for simultaneous solution of elevation and salinity targets**
- **Stochastic simulation capability**
- **Incorporate evaporation and salt precipitation dynamics as function of salinity**
- **Should include nutrient, selenium approximations? Other processes?**
- **May be Multiple Models**

Modeling Options to be Considered

- **SSAM**
  - **Extend use and capabilities**
- **Salton Sea Screening Model**
  - **Extend use and capabilities**
- **EXTEND/STELLA**
  - **Generalized dynamic simulation models**
- **CALSIM**
  - **DWR-supported generalized water resources model**
- **MODSIM**
  - **CSU-supported network model**
- **Others …**

Model Development – Next Steps

- **Fully-develop model goals and limits**
- **Develop list of "required" and "desired" model capabilities**
- **Select modeling platform**
- **Develop model specifications document to guide development**
- **Develop work plan for hydrology and assumptions refinement**

Next Meetings for Work Group

- **Early June Meeting –**
  - **Finalize No Action Alternative**
- **Late June Meeting –**
  - **Variability and Model Development**